CHAPTER 3
DATA COLLECTION

3-1. Overview

One of the major hurdles in this project was identifying potential contributors with similar equipment and then obtaining access to their records to support the development of reliability and maintainability metrics for the components being tracked. This process included identifying contacts, identifying data contributors, and performing site visits.

3-2. Identifying contacts

The first step of data collection was to identify contacts at various facilities that could potentially contribute data to the program. Through the identification procedure over four thousand (4000) facilities were identified.

a. In order to collect statistically valid data it was important that a stratified survey of different facility categories, applications and operating conditions be conducted. Data was collected from the following facility types: communication centers, office building complexes, educational building complexes, hospital complexes, manufacturing facilities, electric generating plants, municipal buildings, housing/hotel, recreational facilities, petroleum processing facilities, and other miscellaneous facilities.

b. These facilities were targeted because they used similar equipment and also provided a variation in applications and maintenance objectives. This was established in an effort to reduce any bias that would result from collecting data in one type of facility. Collecting data from these various facility types was not only necessary to reduce bias, but also to help assure a good coverage across the majority of equipment types of interest. To facilitate this, the following guidelines were developed to assist in the selection of potential sites:

(1) Locations surveyed were required to have varying degrees of maintenance practices.

(2) A number of sites for each facility category were predetermined; this was required to eliminate any skewing of the data caused by the influence of limited data.

(3) Component size was also a basis of site selection to ensure that similar technologies were being compared.

(4) Equipment age was also considered to ensure that data from both the newer high-efficiency generation of equipment and the older technology generation were included. This permitted the determination of reliability and maintainability metrics as a function of time.

c. Varying degrees of maintenance practices was required because it is known that maintenance policies and practices directly affect equipment availability. If a facility has a high level maintenance policy, their availability typically will be lower but the overall reliability typically will increase. On the contrary, a facility with too little maintenance will have a high availability but as the equipment ages, a decrease in reliability. During a prolonged period of operation time with little maintenance, availability and reliability both decrease drastically. Therefore it is apparent that the amount of maintenance performed can drastically affect the performance parameters being collected.

d. A process of identification and certification of data was developed to ensure that each data collection trip was successful. Prior to visiting a facility, the analyst surveyed the site facility manager to assess whether or not that the data they had met the imposed 5 year minimum of operational data. This minimum was established for the data to ensure a sound statistical basis for the analysis.

3-3. Data contributors

The second step of data collection was to identify those contacts which were willing and capable of contributing the required data to the program. This was accomplished by making phone calls to potential data contributors to introduce the program and solicit participation. All communications with the contact were logged in a database for tracking purposes.

a. Once a facility was identified a phone call was made in an attempt to speak to the facility maintenance manager. Most of the time, this first call was not totally successful. A message would be left and the analyst would record the direction of the phone call along with the date and time. Hopefully, the contact would call back, but in the event he did not, at least one more attempt would be made to contact him.

b. The formal procedure for making the contacts was developed early in the program. The procedure outlined below was the standardized approach which proved to be fairly successful.

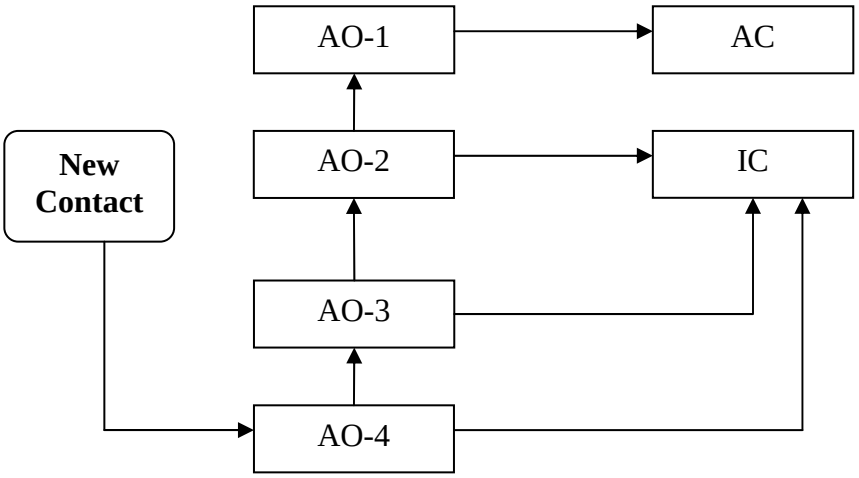
(1) Identify contacts in a specific geographic region from the database contact list so that multiple sites could be visited on one trip.

(2) Contact, by phone, a prospective study participant and explain the PREP program.

(3) If the contact was willing to participate, send background information (form letter and survey) describing who we are, what we are trying to accomplish, and the type of data we are looking for in the study.

(4) If there was a favorable response, this person was contacted again for a data collection visit and questioned as to other locations in the area meeting our requirements.

c. A flowchart detailing this procedure is shown in figure 3-1 and identifies the database priority codes that were established.



AO-1: Ready to visit/visit set up
AO-2: Communications in progress
AO-3: Ready to contact
AO-4: Facility identified/information incomplete (address/location)
AC: Visited and all data has been collected/received
IC: No, or insufficient data, or unwilling/unable to help

Figure 3-1. Flowchart of PREP database priority codes

d. Of the four thousand plus facilities identified, one thousand five hundred ninety three (1593) were actually called and were closed either because the data was collected or the facility was determined to not be a viable contributor of data. All correspondence with potential data contributors was recorded whether the solicitation resulted in a visit or not. These phone calls resulted in approximately a ten percent success rate at finding a facility with the required data and actually collecting data. This resulted in a total of 162 sites that were contacted and visited. Figure 3-2 represents the distribution of eleven facility types that were used in the study. As indicated in figure 3-2, the majority of the data contributors fall into two categories. Those categories are electric generating plants and hospitals which combined made up 58% of the total contributors.

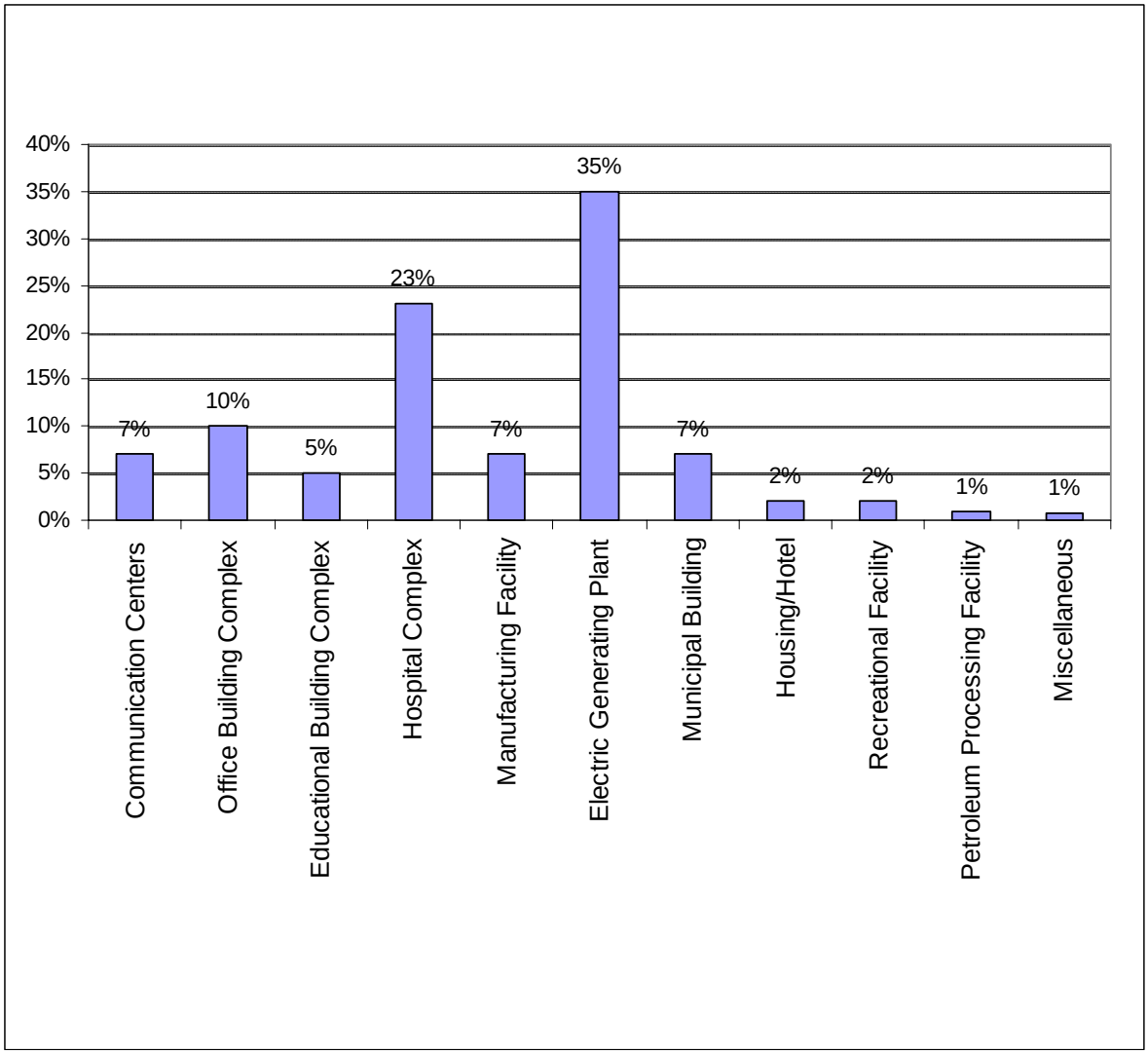


Figure 3-2. Distribution of data contributors

e. These contacts were the key to the success of this program. Without the cooperation and support of the people involved from the many facilities, this effort would have been very difficult. Even during times of budget and personnel reduction these facilities donated their time, understanding the importance of this program and provided high quality data to support the Power Reliability Enhancement Program.

f. A concerted effort was employed to develop an extensive contact database using manufacturers, facilities, societies, and locations of any potential data contributor utilizing PREP components. Manufacturers were contacted not only for possible collection of actual maintenance data, but also for any warranty data that may be available. Several manufacturers participated, including Caterpillar, Westinghouse Electric and Electro-Motive Diesel.

g. Several professional societies were also contacted. With their cooperation and support the program was provided substantial merit and integrity. Some of the societies contacted included American Gas Association, National Association of Power Engineers, American Society of Mechanical Engineers, Association of Physical Plant Administrators, and the Association of Energy Engineers: